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The present invention relates to an apparatus and a method for cleaning a surface of an orbital laminar element, in particular an escalator or a roll volume in accordance with the preamble of the claim 1 and/or. the claim 10.

▲ **top** Vorrichtungen und Verfahren zum Reinigen von Oberflächen, insbesondere Mauerwerken sind bekannt. Hierbei wird eine Strahldüse, mittels welcher das Strahlgut auf das zu reinigende Mauerwerk aufgestrahlt wird, durch eine Bedienerperson geführt. Jet nozzle and operator person are in a completed booth, which is provided with a grating soil, by which the jet-good up-radiated on the masonry and the solved dirt particle abgesogen and become a dressing plant supplied. Diese Arbeitsweise ist insbesondere für die Bedienerperson nicht angenehm, da sich diese direkt im vom Strahlgut durchsetzten Arbeitsraum befinden muss. In particular a such cleaning operation for escalators is not more conceivable or roll volumes.

Cleaning escalators or roll volumes detergents inserted, which are present in the form of liquids, become large. Since escalators and roll volumes are mostly switched and/or in shafts from buildings housed, it must be paid attention very much to the fact that the cleaning liquids do not come to strong with the mechanical drives into contact. This requires a careful proceeding, which with additional effort connected is.

The object of the instant invention consists now of creating an apparatus and a method possible with which cleaning becomes in particular an escalator or a roll volume also on the surface up-radiated jet-good, whereby the up-radiated jet-good is to become if possible complete again aspirated. Thus can be done without the use of detergents in liquid form.

Made the according to invention solution of this object by in the identification of the claim 1 and/or. the claim of 10 indicated features.

Mit dieser erfindungsgemässen Vorrichtung und gemäss dem Verfahren lässt sich beispielsweise eine Rolltreppe oder ein Rollband in einfacher Weise und ohne grossen Aufwand reinigen. The holding device can become problem-free between the two wandförmigen parts of the escalator or the roll volume, which forms the railing, clamped, the Strahlkopf is more movable by means of the carriage along a guide rail of the holding device transverse to the machine direction of the escalator or the roll volume, whereby in advantageous manner drive means are provided.

Additional one is still the Strahlkopf around a rotation axis rotatable in the support held, which is essentially vertical aligned to the surface which can be cleaned, whereby the twist over a rotary drive made. Thus also the respective edge area of the escalator or the roll volume can become cleaned in optimum way.

To the automatic expiration of the cleaning operation of an escalator or a roll volume a control device is provided, whereby mounted at the Strahlkopf in its edge areas limit switches are to the delivery of signals to the control device. Weitern at least a sensor is provided in advantageous manner, with which the cleaning temperature of the cleaned strip of the surface is more detectable,

according to which the Strahlkopf displaced will, in order to clean a next strip of the escalator or the roll volume.

An advantageous embodiment of the invention exists therein that an other sensor at the Strahlkopf is arranged, with which the joints of the composite of laminar members, which become cleaned, found to become can. Wenn die Fuge nun in den Bereich der Strahldüse des Strahlkopfes kommt, bewirkt die Steuereinrichtung ein kurzzeitiges Unterbrechen des Strahlens. By the fact avoided becomes that that can arrive to jet-good into the joints of the escalator or the roll volume.

An embodiment of an apparatus according to invention and an invention process for cleaning the surface of one orbital laminar element becomes subsequent exemplarily more near explained on the basis the accompanying drawing.

It shows

Fig. 1 in schematic illustration a plant for cleaning an escalator or a roll volume;  
Fig. 2 a view in machine direction of the escalator or the roll volume on the clamped holding device also, to it, which can be cleaned, arranged Strahlkopf;  
Fig. 3 a cross sectional view along line III III of the apparatus in accordance with Fig. 2;  
Fig. 4 in schematic illustration the arrangement of the sensors and limit switches in the Strahlkopf;  
and  
Fig. 5A to 5C a representation of the positions, which the Strahlkopf takes during cleaning an escalator or a roll volume.

As from Fig. 1 apparent is, essentially consists the apparatus for cleaning a surface of an orbital laminar element, in particular an escalator or a roll volume 1 of a compressor 2, a compressed air tank 3, a pressure jet container 4, a Strahlkopf 5 and a sucking off and a separator 6. In known way the compressed air becomes from the compressed air tank 3 4 supplied over a conduit 7 the pressure jet container, where that becomes jet-good admixed. From here the compressed air with that arrives to jet-good over an other conduit 8 into the Strahlkopf 5, becomes jet-good in which the compressed air with that over a nozzle 9 on the surface which can be cleaned 10 up-irradiated.

The Strahlkopf 5 is at its surface 10 which can be cleaned directed peripheral area with a bürstenförmig formed seal 11 provided. Thus a cavity becomes formed, in which by the suction device 6 a vacuum generated will and whereby that becomes jet-good with the dirt particles loosened from the surface over the conduit 12 aspirated. In the suction device 6 that can become jet-good of the dirt particles separate in known way, which can become so conditioned jet-good again used.

As from the Fig. 2 and 3 apparent is, consists the holding device 13 of a longitudinal section 14, at whose both ends in each case a bracket 15 mounted is, which is 16 provided with suction cups. The brackets 15 are more adjustable and fixable in known way in longitudinal direction of the longitudinal section 14, whereby the holding device can become clamped between two wandförmige parts 17, which form the lateral limitation of an escalator or a roll volume 1. The longitudinal section parallel becomes the surface 10 of the escalator or the roll volume which can be cleaned 1 clamped.

Along the longitudinal section 14 guide rails are 18 fixed. These guide rails 18 cooperate with guide members 19, which are 20 fixed at a carriage, so that the carriage 20 is more displaceable in longitudinal direction of the longitudinal section 14 guided.

Likewise along the longitudinal section 14 a rack is 21 fixed, in which a gear 22 intervenes, which is 23 fitted on a driving motor, which is in the carriage 20 fixed.

At the carriage 20 a support is 24 mounted, is 25 inserted into which a rotation axis, at which the Strahlkopf 5 fixed is. The rotation axis 25 is höhenverstellbar in known way of rotatable and in the support 24 held. In known way the rotation axis can become 25 concerning the support 24 by a rotary drive 26 twisted.

In Fig. 3 is the arrangement of the jet nozzle 27 in the Strahlkopf 5 apparent, whereby the representation is schematic. On this jet nozzle 27 the not represented other conduit 8 (Fig

becomes. 1) attached. Likewise apparent is a suction nozzle 28, becomes 12 fitted on which the not represented other conduit.

At the Strahlkopf 5 directed peripheral area is the bürstenförmig formed seal 11 mounted at its surface 10 which can be cleaned. The Strahlkopf 5 becomes 10 lowered in the mounted state of the holding device 13 so far on the surface that the seal 11 as fully as possible this surface 10 rests upon.

Fig. a plan view shows 4 to the Strahlkopf 5 in schematic way, whereby the suction nozzles 28 and the upper part of the jet nozzle 27 as well as the rotation axis 25 apparent are. The Strahlkopf 5 is dreiecksförmig formed, whereby the jet nozzle is 27 in the region of a tip of this triangle arranged, which forms the front region of the Strahlkopfes at the same time. This tip becomes 5 formed by two sides 29 and 30 of the Strahlkopfes, while the suction nozzles 28 at the base side 31 of the Strahlkopfes are 5 arranged.

At both sides 29 and 30 of the Strahlkopfes 5 one front limit switch 32 and a rear limit switch each are 33 arranged. These limit switches 32 and 33 are 35 connected over conduits 34 with a control device.

In each case in the central portion of the sides 29 and 30 and the base side 31 of the Strahlkopfes 5 one sensor each is 36 mounted, which are 35 connected over a conduit 37 with the control device in each case.

At the tip of the Strahlkopfes 5 an other sensor is 38 mounted, which is connected over a conduit 39 with the control device.

Cleaning an escalator or a roll volume 1 the holding device 13 becomes, like this in the Fig. 2 and 3 shown is and like for this described is, between the two wandförmigen parts 17 clamped. The Strahlkopf 5 takes a middle position, like this by Fig. 5b shown is. The escalator or the roll volume 1 now started can become, the machine direction is by the arrow 40 indicated. At the control device 35 the cleaning operation started can become. That jet-good becomes now up-irradiated, according to which this, over the jet nozzle 27 on the surface which can be cleaned, as described, aspirated together with which becomes replaced dirt particle. The crosswise longitudinal joints of the escalator or the roll volume 1 become 38 found by the sensor, the control device 35 an effected interruption of radiating the jet-good, if this corresponding joint goes through the region of the jet nozzle. By this procedure a strip of the escalator or the roll volume becomes 1 cleaned. The cleaning temperature can become by the sensor 36 found, which is 5 mounted at the base side 31 of the Strahlkopfes. If the required cleaning temperatures achieved is, the effected control device 35 that the Strahlkopf becomes displaced along the guide rail, as the driving motor becomes 23 activated. The shifting way corresponds to a measure, which is smaller than the width of the cleaned strip. Afterwards the next strip of the escalator or the roll volume becomes 1 cleaned.

Before the Strahlkopf knocks against 5 the wandförmigen part 17, the rear limit switch 33 emits a signal to the control device 35, whereby the rotary drive activated will and the Strahlkopf becomes 5 rotated, until the side is 29 parallel 17 aligned to the wandförmigen part, like this in Fig. 5a shown is. The cleaning operation becomes then continued, whereby the cleaning temperature becomes now 36 found by the sensor, which is in the region of the side 29 of the Strahlkopfes 5 arranged. If the wandförmige part is 17 achieved, i.e. if the rear limit switch 33 and the front limit switches 32 to the control device 35 it emits a signal and the sensor 36 emits the signal, which is the required cleaning temperatures achieved, the effected control device 35 that the supply of the jet-good becomes stopped, the Strahlkopf goes back into the home position, shown in Fig. 5b.

From this position the cleaning operation of the escalator or the roll volume can become 1 on the other side started, whereby the expiration corresponds to that preceding described and the symmetrical arranged monitoring elements come to the use, until the corresponding end position is achieved, shown into Fig. 5C.

After the termination of the cleaning operation the holding device 13 can be dismounted again.

With this mechanism and this method for example an escalator or a roll volume can become 1 in optimum way cleaned in simple manner.

It is also more conceivable to specify in place of the sensors 36 to the detection of the cleaning temperature of the cleaned strip the time how prolonged is to be the Strahlkopf 5 in a respective position to the cleaning of a strip. This time can become for example in response of the length of the escalator or the roll volume and its speed fixed.